

TITLE OF THE INVENTION

SYSTEM, METHOD AND COMPUTER READABLE MEDIUM FOR CERTIFYING  
RELEASE OF ELECTRONIC INFORMATION ON AN INTERNET

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This document claims priority under 35 USC §119 to Japanese Patent Application  
Nos. 11-341288 and 11-341289 filed on November 30, 1999, the entire contents of which are  
hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the invention

10 The present invention generally relates to a certifying system, method, program, and  
computer readable medium which certifies the existence of prescribed electronic information,  
and in particular relates to a system, method, program, and a computer readable medium  
which is capable of certifying the release of prescribed electronic information on a network.

Discussion of the Background

15 A method and system for certifying the existence of electronic information on a  
specified date are described, for example, in U.S. Patent Nos. 5,136,647, 5,136,646,  
5,373,561, and 5,781,629, and U.S. Reissued Patent No. 34,954.

However, such a technology does not certify the release of specified electronic  
information on an Internet or the like.

20 Further, recently technical information is increasingly being disclosed on the Internet  
or the like, which technical information includes contents similar to those released in a form  
of a magazine or a book. Moreover, such communication on the Internet may be more  
prompt than a conventional publication. Thus, investigators also increasingly utilize the  
Internet or the like to promptly publish his or her investigation results.

25 Further, since the transmission of information via the Internet is easy and not costly  
when compared with a conventional publication, a lot of information is being released on the

Internet or the like. Even if the conventional technology can certify the existence of electronic information, it can not certify the release of electronic information on the Internet or the like. In such a case, i.e., if the release of a prescribed fact on an Internet or the like is not certified, a patent can possibly be obtained by another person even if its contents are the same as in information released on the Internet.

In addition, technical information released on the Internet or the like has substantially the same effect as a publication. As a result, a clause has been newly established in the Japanese Patent Law that an invention available to the public through an electronic communication line before filing cannot be patented. However, it is difficult to certify a prescribed fact such as when technical information has been released on the Internet or the like, and whether the released technical information has been changed. Thus, there generally is a drawback of less reliability of certifying such a fact on the Internet than certifying such a fact in a conventional publication.

On the other hand, a document utilized such as on the Internet is generally made such as by a hypertext markup language (hereinafter referred to as an HTML), and generally includes a variety of objects that occasionally are embedded inline therein. In these objects, some objects that occasionally require a Plug-in software for Browser use and/or an accessory application and any of one a static image, an animation, a sound, and a Java (TM of Sun Microsystems Corporation) Applet may be included. A document generated such as by the HTML with embedded objects generally constitute, in combination, electronic information released such as on the Internet to the public.

Further, a hyperlink occasionally is connected to a document generated such as by an HTML. An object is occasionally provided including a document generated such as by an HTML to be referred to as an external resource. However, the electronic information released such as on the Internet is generally constructed by supposing that the electronic information is inspected in an online manner. Therefore, if the electronic information is locally preserved (i.e., stored in a storing device of a PC), an object either embedded or referred to occasionally is not available from the electronic information because the hyperlink is disconnected. As a result, it can not be noted and accordingly not certified after the end of the release on the network (i.e., Internet) what electronic information was released on the network.

## SUMMARY OF THE INVENTION

The present invention has been made in view of the above noted and other problems, and one object of the present invention is to address and resolve such problems.

5 A further object of the present invention is to provide a novel method of certifying at least the existence of electronic information released on a network at a prescribed time and date that connects one or more computer servers and a plurality of client computers with each other.

10 The method may include the steps of: accessing electronic information of a web page stored in a prescribed one of a plurality of client computers using information of its location from one of the computer servers based on a request from one of the client computers; obtaining a copy of the electronic information; generating attribute information from at least the location, time, and date when the step of accessing the electronic information is executed; generating an electronic certificate by uniquely specifying the electronic information and the attribute information; obtaining the electronic certificate; storing the copy of the electronic  
15 information in a memory by tying up with the electronic certificate and the attribute information; and, reading and providing at least the electronic certificate and the attribute information, and preferably the copy of the electronic information, from the memory to the one of the client computers or its operator.

20 In another embodiment, the method may further include the steps of: periodically accessing the electronic information; generating and obtaining the electronic certificates each time the access is periodically executed; storing all of the copies of the electronic information by tying up with a corresponding electronic certificate and attribute information in a memory; and, providing all of the electronic information together with the corresponding electronic certificate and attribute information to the one of client computers or its operator.

25 In yet another embodiment, the unique specification for the electronic certificate is executed by using a hash value calculated from both of the electronic information and its attribute information in a prescribed manner, obtaining another hash value from the former hash value in a prescribed manner, and after that assigning the calculation result to the electronic certificate as an inherent information thereof, so that if the electronic information  
30 or the attribute information is falsified it can be noted from a change in the hash value of the falsified electronic information and the attribute information.

In yet another embodiment, the step of accessing the electronic information may be

executed from another computer server to represent that the electronic information is not limited to a specific computer server to access.

In yet another embodiment, the step of accessing the electronic information is executed at an interval to collect all of changes in a web page.

5 In yet another embodiment, the method may further include the steps of: displaying one or more links representing locations of the electronic information, respectively; and allowing the public to access the electronic information using an applicable link via one of the computers so that it is represented that the electronic information is accessible and employable as evidence.

10 In yet another embodiment, the method may further include the steps of: detecting a change in the contents of the electronic information; and storing the change in the memory in addition to the electronic information initially stored if the change is detected.

15 In yet another embodiment, the method may further include the steps of: generating a database in one of the computers other than the one of the computer servers from one or more electronic information stored in the memory; and allowing public to retrieve the electronic information via the one of the computers other than the one of the computer servers so that it is represented that the electronic information is accessible and employable as evidence.

20 In yet another embodiment, the method may further include the steps of: generating one or more abstracts of the electronic information stored in the memory; generating a database in one of the computers other than one of the server computers of the one or more abstracts; and, allowing the public to retrieve an abstract via the one of the computers other than one of the server computers.

25 In yet another embodiment, the method may further include the step of storing information which indicates the availability of retrieval of the electronic information via the network, in a memory when the electronic information can be retrieved via one of the computers so that it is represented that the electronic information is accessible and employable as evidence.

30 In yet another embodiment, the attribute information may further include at least any one of an electronic information displaying period of time, the access source IP address, and a number of access times so that the electronic information can be objective when used as evidence.

In yet another embodiment, the method may further include the steps of: detecting if an object is included in the electronic information when the electronic information is locally preserved in a one of the client computers; and changing contents of a copy of the electronic information by describing a reference into the copy of the electronic information so that the object can be viewed in the one of the client computers.

In yet another embodiment, the electronic certificate and/or the electronic information may be provided with a read only medium.

### BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the present invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a block chart illustrating a perspective view of an overall system according to the present invention;

Fig. 2 is a flowchart illustrating a first example of a certifying operation practiced in a service provider's server in response to a request for an electronic information recordation;

Fig. 3 is a flowchart illustrating a second example of a certifying operation practiced in a service provider's server in response to a request for an electronic information recordation;

Fig. 4 is a chart illustrating one example of a sort of information to be preserved when prescribed electrical information to be certified is periodically accessed in the second example as illustrated in Fig. 3;

Fig. 5 is a flowchart illustrating a third example of a certifying operation wherein an electronic certificate, which specifies prescribed electronic information and attribute information, is issued to a service requester;

Fig. 6 is a chart illustrating one example of a process for generating a hash value communicated between the service provider's server and a time stamp certificate issuing server illustrated in Fig. 1 when the electrical certificate is to be issued;

Fig. 7 is a chart illustrating one example of contents of an electronic certificate issued from the time stamp certificate issuing server illustrated in Fig. 1;

Fig. 8 is a chart illustrating a conventional display screen of a web page to be

inspected online;

Fig. 9 is a chart illustrating a display screen of a web page when inspected offline;

Fig. 10 is a block chart illustrating a function of a modified service provider's server 5' that is switched from and utilized in lieu of the service provider's server 5;

Fig. 11 is a flow chart illustrating a fourth example of a certifying operation practiced in the modified service provider's server 5' illustrated in Fig. 10 in response to a request for electronic information recordation;

Fig. 12 is a flowchart illustrating details of a copy-obtaining step practiced in the certifying operation illustrated in Fig. 11 for obtaining a copy including an object;

Fig. 13 is a chart illustrating one example of objectives to be calculated into a hash value;

Fig. 14 is a chart illustrating another example of objectives to be calculated into a hash value;

Fig. 15 is a chart illustrating still another example of objectives to be separately calculated into a plurality of hash values; and

Fig. 16 is a flowchart illustrating a certifying operation practiced in response to a request for recorded contents.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, wherein like reference numerals and marks designate identical or corresponding parts throughout the several figures.

Initially, several services provided by the present invention is now summarily described. A requester may request, as a first type of service, a service provider for recordation of a prescribed web page of his or her own world wide web (hereinafter referred to as a WWW) site that is connected to an Internet, so that both that existence and the location of the prescribed web page can be known to the public as a prior-art.

A requester may request, as a second type of service, a service provider to display link information on a prescribed web page of the service provider for the same purpose as noted above.

During the first service, the service provider may access and copy a prescribed web page having a prescribed URL designated by the requester from a prescribed Internet protocol (hereinafter referred to as an IP) address, which is assigned to each of personal

computers, at an optional timing. Such a prescribed IP address and optional timing may be unknown to the requester so that the web page can be prior art which any third person can access. Subsequently, the service provider may generate an attribute information from the prescribed URL of the prescribed web page and the prescribed IP address as an access  
5 source. The service provider may then obtain a prescribed electronic certificate that uniquely specifies the copy of the web page and its attribute information including time and date data.

The service provider may then tie up and preserve the copy of the web page and its attribute information with the prescribed electronic certificate.

Further, the service provider may access again the prescribed web page of the  
10 prescribed URL from another IP address at another optional timing that is also unknown to the requester and copy the web page. Thus, the service provider can substantially obtain evidence for certifying that the prescribed WWW server displaying the prescribed web page does not limit access to the requester. Subsequently, the service provider generates the attribute information in the same manner as noted above and obtains a prescribed electronic  
15 certificate which uniquely specifies the copy of the web page and its attribute information with time and date data. The service provider may then tie up the copy of the web page and its attribute information with the electronic certificate, and then preserve them. The service provider repeats such processes during a prescribed time period designated by the requester.

Further, when the above-noted second service is requested, the service provider may  
20 display information of a link to the prescribed URL of the web page designated by the requester on his or her own web page of a WWW server connected to the Internet to allow the public access to the prescribed home page using the link information. For example, a link can be retrieved by the public per a requester or a field of contents. The link displayed on the WWW server may also be recorded and preserved along with its displaying time period or  
25 the like.

Thus, the requester can request the service provider for contents of the recorded web page designated as described in the above either simultaneously when the above-noted service is requested or when it is practically needed. In response to this request, the service provider may provide a copy of the web page, the attribute information, and the electronic  
30 certificate.

After that, the above-described data can be written into a CD-R or similar memory and then be provided to the requester. The copy of the web page, the attribute information,

and the electronic certificate can otherwise be provided to the requester via the Internet.

Further, the second type of service may provide the requester with the fact that the link to the designated web page is displayed on the WWW server of the service provider, and the displaying time period or the like of the designated web page on the WWW server in a certificate form. The requester can utilize the information received from the service provider as evidence for certifying that his or her own web page is open (i.e., accessible to the public) on the Internet during the certain period of time.

Beside the first and second types of services, a requester can request a third type of service of recordation of a fact that a retrieval engine for public use connected to an Internet can retrieve a prescribed web page designated by the requester. Such a fact may certify both the existence and the location of the prescribed web page as is more readily noticeable for the public. In such a case, the service provider may retrieve the prescribed web page designated by the requester using an appropriate keyword or the like through a retrieval engine.

The retrieval engine may optionally be utilized to certify that not only can the prescribed retrieval engine retrieve the web page, but also that any kind of retrieval engine can do so. In other words, to certify that the web page can be accessible and its contents can publicly be known. When the designated web page can be retrieved, the fact that the designated web page can be retrieved, an address and a name of the retrieval engine, the keyword, and the retrieval time and date or the like may be recorded. These records can be provided to the requester as a certificate responsive to its request for recorded contents.

The requester can, of course, request the service provider to record a web page stored in a WWW server of another person when the web page is supposed to be a prior art. In such a case, the service provider may execute the similar operations as described with reference to the first type of service.

However, there is no guarantee that the web page of the third person's WWW server is continuously maintained during a certain period of time that is designated by the requester as web pages occasionally disappear or are modified. If the web page disappears, the service provider may record a time period during when the web page was open on the Internet. In addition, the service provider may provide the requester with information of the time period in addition to information ordinarily provided (i.e., the copy of the web page) in response to a request for recorded contents.

If the web page is modified and the above-described operation is executed in a similar



manner, a modified career may remain. The web page stored in the WWW server of the other person can be designated by the requester using a URL of the web page. Otherwise, one or more web pages can be designated by one or more URLs obtained by keyword retrieval through a retrieval engine.

5 Further, a requester can request a service provider for a fourth type of service of recordation of a transition of a web page version stored in his or her own or another person's WWW server. The service provider may then execute substantially the same operations as described with reference to the first type of service.

10 However, the service provider may examine whether contents of the web page appearing at a current access are different from those of the web page appearing at a previous access using a prescribed device. If those are different from one another, the fact that the current web page is different from the previous one may be recorded. In this case, the service provider may not be required to preserve a copy of the web page because the requester preferably preserves the same at its personal computer.

15 If the service provider does not preserve the copy of the web page, objectives to be preserved by the service provider at each access made in both of the first service and its modified type of services may be only the attribute information and the electronic certificate. A change in the version can be recorded as follows. When both of the current and the previous accesses are made and both of the contents of the home page are different from each other, only a change in the version of the web page can be preserved.

20 Otherwise, the entire web page fully changed may be preserved only when a change exists in both of the contents. Further, when recordation is requested in both of the first service and its modified type of services, a recording time period, a number of recording times, a recording frequency, or the like, may be designated by the requester. The service provider may execute prescribed recordation in accordance therewith. Further, the second service to the fourth service type can be optional; in particular, the services of both of the third and fourth types of requests may not be required if the existence of the web page and its location have already been known to the public.

25 On the other hand, while the service provider continues any one of such services, the service provider may unavoidably hold a great number of web pages respectively attaching an electronic certificate that certifies the fact that an applicable web page is open on the Internet. Then, that information may be utilized so that the service provider can perform a

prescribed service of providing any person with a web page attaching an electronic certificate as a fifth type of service. For example, the service provider may construct a prescribed database that allows keyword retrieval or the like via an Internet, and provide a third person with a prescribed retrieval service.

Specifically, the service provider may provide contents of a record with a medium such as a CD-R or via the Internet in response to a request of a retrieval for providing recorded contents retrieved. As a modification, an abstract of the web page attaching an electronic certificate may be generated and a database may be constructed in a prescribed form so that screening of the retrieval can be performed using the abstract.

A construction of a certifying system utilized in the above-described services for certifying release of an electronic information is now described referring to Fig. 1.

A first server 3, a second server 5, a third server 7, a fourth server 9, a fifth server 11, and a plurality of computers may be provided to be connected to a network 1 including, for example, an Internet. The first server 3 may include a WWW server that stores an electronic information such as a web page 31 whose URL is, for example, <http://www.abcd.co.jp>, and which is open on the network 1.

The second server 5 may be supervised by a service provider and may access electronic information designated by a requester and execute the following various functions. Namely, the second server 5 may include a copy obtaining function 51 of accessing electronic information designated by the requester and obtaining a copy thereof. The second server 5 may also include an attribute information generating function 53 of generating attribute information associated with the location of electronic information such as a URL and an access condition. The second server 5 may also include a certificate obtaining function 55 of obtaining an electronic certificate that uniquely specifies both of a copy of electronic information and its applicable attribute information with time and date data.

The second server 5 may also include a preservation function 57 of preserving prescribed necessary information responsive to a request from a requester, and a certificate providing function 59 of providing an electronic certificate or the like to the requester. A memory 61 described later in detail may be connected to the second server 5.

The third server 7 may include a time stamp certificate issuing function 71 of issuing a certificate which uniquely identifies and certifies prescribed electronic information with time and date data based on a request from the second server 5. The third server 7 may

receive a certificate issuing request via the network 1 from the second server 5, issue the electronic certificate using the time stamp certificate issuing function 71, and then return the same to the request source (i.e., the second server 5).

The fourth server 9 may include a prescribed function to assist the second server 5, so that it may display one or more information of a link 91 to a prescribed web page, for example of a WWW server, designated by a requester.

However, a database of such information of the link 91 can be provided to be retrieved per contents or an owner of a linking destination web page or the like. Further, a database 95 may be provided using data stored in the memory 61. The fourth server 9 may include a retrieving function 93 of retrieving the database 95 via the network 1. Further, a database 97 may be provided to include a plurality of abstracts of electronic information generated from data stored in the memory 61. The retrieval function 93 may retrieve the database 97 via the network 1.

The fifth server 11 may be provided to be used by the public as a retrieval engine. Since construction of the fifth server 11 may substantially be the same as that of a conventional retrieval engine, a thorough description thereof is omitted.

A plurality of services provided responsive to the first type and its modified services in accordance with the present invention is now described with reference to an operation of the system illustrated in Fig. 1.

The requester may designate a prescribed web page having a prescribed URL, such as <http://www.abcd.co.jp>, as electronic information, and request the service provider for the above-noted first type of service and its modified services.

The service provider may execute prescribed operations using the second server 5. Specifically, the copy obtaining function 51 may access the prescribed web page of the URL (i.e., <http://www.abcd.co.jp>) of the first server at an optional timing via the route A, and obtain a copy of the web page 31 via the route B shown by a dotted line. The copy may be stored, for example, in a main memory (not shown) provided in the second server 5. The copy obtaining function 51 may also store an IP address of an accessing source (i.e., any one of servers belonging to the service provider) in the main memory every time an access is made. The copy obtaining function 51 may include a function of determining a plurality of address conditions used when an access is made, for example determining a prescribed access timing among periods of time designated by a requester and a prescribed IP address of

an accessing source.

When the requester designates a prescribed access frequency, the copy obtaining function 51 may execute scheduling of an access to meet the designated access frequency. The attribute information generating function 53 may generate attribute information including the URL designated by the requester and the IP address of the accessing source. The attribute information can include an IP address assigned to a proxy server (not shown) and an access time and date when the second server 5 is connected to the network 1 via the proxy server.

The certificate obtaining function 55 may obtain an electronic certificate with regard to the copy of the web page obtained and the attribute information generated. In the system of Fig. 1, the certificate obtaining function 55 may generate and transmit a request for issuance of an electronic certificate via the route C to be received by the time stamp certificate issuing function 71 of the third server 7. The certificate obtaining function 55 may receive the electronic certificate from the time stamp certificate issuing function 71, for example, via the route D. The time stamp certificate issuing function 71 is described later in further detail. The preservation function 57 may preserve the copy of the web page 31, the attribute information, and the electronic certificate in the memory 61.

However, the preservation of the copy of the web page 31 may be optional because the requester may preserve the same by himself or herself. The preservation function 57 may determine that a copy of a web page currently obtained should not be preserved if the web page has substantially the same contents with those of a web page previously obtained.

Moreover, the preservation function 57 may preserve data of the copy of the web page or the like per a requester and/or a designated URL so that the certificate providing function 59 will readily take out necessary data. A requester may request for recorded contents simultaneously when a recording request is made or at an optional timing. As a result, the certificate providing function 59 may read the copy of an objective web page 31, its attribute information, and the applicable electronic certificate from the memory 61 responsive to the request. The certificate providing function 59 may then store those information in a storage medium 63 such as a CD-R and provide it to the requester.

As one example, the certificate providing function 59 may store, in the storage medium 63, all of the copy of the web page 31, the attribute information, and the electronic certificate all obtained and stored in the memory 61 at every access, and provide the same to

the requester. Otherwise, the certificate providing function 59 may store and provide only the copy of the web page 31 obtained at a first access, all of attribute information, and all of electronic certificates, if the web page 31 does not change its contents at one or more later accesses.

Moreover, the certificate providing function 59 may generate an access record that includes a URL, an access source IP address, and a certificate releasing time period and date from the attribute information and the electronic certificate. Thus, the service provider may provide a prescribed certificate including the access record, the web page 31 obtained at a time of the first access, all of the attribute information, and all of the electronic certificates.

However, the certificate providing function 59, of course, may not provide the requester with the copy of the web page 31 if the preservation function 57 does not preserve the copy of the web page 31.

The above-discussed second type of service provided by the present invention is now described with reference to the system illustrated in Fig. 1.

As described earlier, in the second type of service, a requester requests a service provider to display a link to a prescribed web page so that the public can have notice of both the existence and the location of the web page. Responsive to the request, the service provider may display a link 91 to the prescribed web page 31, which is for example stored in the first server 3, on a web page of the fourth server 9. If a number of such requests are relatively small, it is sufficient to display only a URL of the prescribed web page on the web page of the fourth server 9.

However, if a number of requests are relatively large, a database of the link 91 may preferably be constructed so that a third person can retrieve a prescribed link based on contents of a web page or an industry sort of a requester via the network 1. The service provider may store a set of time periods during when a link 91 to a web page 31 has been displayed on the web page of the fourth server and retrieval has been available, and provide a requester or the like with such records as a certificate.

The above-discussed third type of service provided by the present invention is now described in further detail referring to the system illustrated in Fig. 1.

As noted earlier, recordation of an event that a prescribed web page designated by a requester may be retrieved using the fifth server 11 as a retrieval engine for public use via the network 1 may be requested from the requester to the service provider. The service provider

may retrieve the prescribed web page with the retrieval engine using an appropriate keyword or the like via the second server 5. If the prescribed designated web page can be retrieved, the service provider may record that fact, a name and IP address of the fifth server 11, the keyword, or the like, and the retrieval time and date, or the like. Upon a request, such a  
5 record may be provided to a requester as a prescribed certificate for certifying the existence of the web page as a prior art.

The above-discussed fourth type of service provided by the present invention is now described in further detail with reference to the system illustrated in Fig. 1.

As noted earlier, a transition of versions of a web page 31 may be recorded upon  
10 request to the service provider. The service provider may execute operations similar to those executed in the first service using the second server 5. Specifically, the service provider may access a web page 31 of the first server 3 at a specified timing and obtain a copy of the web page 31. Subsequently, the service provider may generate attribute information including the URL and the access condition, and obtain an electronic certificate with regard to the attribute  
15 information and the copy of the web page 31. The service provider may then preserve at least the attribute information, the electronic certificate, and preferably the copy of the web page 31 in the memory 61.

Subsequently, the service provider may again access, by executing similar operations, the prescribed web page 31, for example of the first server 3, at a later specified timing, and  
20 obtain a new applicable electronic certificate with regard to new attribute information and the copy of the web page 31. The service provider may then determine whether the copy of the web page 31 obtained at the first access (i.e., the web page 31 whose last change is being detected) is different in contents from those of the copy obtained at the current access. This determination may be performed either by the copy obtaining function 51 or the preservation  
25 function 57. If the contents are different from each other, such a fact may be recorded in the memory 61 in addition to at least the new attribute information and the new electronic certificate.

As one example, a difference between the contents of the web page 31 obtained at the first access and those of the web page 31 obtained at the current access can be recorded in the  
30 memory. Otherwise, a copy of the entire changed web page 31 can be preserved in the memory (if both contents are different from each other). Upon a request, the service provider may provide such a record including at least the fact of change, the attribute information, and

the electronic certificate. Only different portions or entire portions of the copy of the web page 31 may be provided when the contents are changed.

The above-discussed fifth type of service provided by the present invention is now described with reference to the system illustrated in Fig. 1.

5 A web page providing service for providing a web page and an electronic certificate may be executed. Specifically, the service provider may use a retrieving function 93 with the fourth server 9, and produce a database 95 from a plurality of electronic certificates stored in the memory 61, a plurality of copies of web page 31, and a plurality of attribute information. Thus, a third person can retrieve the database 95 using the retrieving function 93.

10 When recognizing a prescribed web page 31 to be used as a prior-art, a third person may send a request to the service provider for provision of recorded contents via the network 1 or the like. The service provider may then preferably obtain a copy of an applicable web page and applicable attribute information and an electronic certificate.

15 Subsequently, the service provider may utilize the certificate providing function 59 so as to store each of the applicable copy of web page 31, the applicable attribute information, and the electronic certificate in the CD-R to provide to the requester. Otherwise, such data can be transmitted via the network 1. As a modification, the service provider may produce an abstract of the web page from one or more copies of a web page so as to construct the database 97 so that a third person can retrieve a prescribed abstract using the retrieving  
20 function 93. The third person may then confirm a corresponding copy of a web page 31 and request applicable recorded contents of necessary electronic information based on a result of screening of the abstract database 97.

A procedure of the first type of service and its modified services provided by the present invention is now described with reference to a flowchart of Fig. 2.

25 When a requester requests the service provider to record prescribed electronic information such as a web page by designating both of its location (e.g. URL) and a recording condition such as a recording time period (in step S1), the copy obtaining function 51 may determine an access condition (in step S3) in accordance with the recording condition. The copy obtaining function 51 may then access a prescribed web page of the  
30 URL at a prescribed timing from a prescribed access source IP address, and obtain a copy of the web page (in step S5).

Further, the attribute information generating function 53 may generate attribute

information from the URL of the web page and the address source IP address as an address condition (in step S7). After that, the certificate obtaining function 55 may obtain, from the time stamp certificate issuing function 71, an electronic certificate which specifies the attribute information and the copy of the web page with the certifying time and date (in step S9).

The second server 5 can be configured to include a function of the time stamp certificate issuing function 71, and the certificate obtaining function 55 can be replaced with time stamp certificate issuing function 71. The preservation function 57 may then store at least the attribute information and the electronic certificate in the memory 61 (in step S11). That is, as described earlier, the copy of the web page may optionally be preserved in the memory 61. These operations may be repeated until a recordation terminating condition is satisfied (in step S13). The recordation terminating condition may include several factors such as elapsing of a prescribed recording time period or reaching a prescribed number of recording times, which may be designated by the requester.

An operational flow for the fourth type of service is now described with reference to Fig. 3.

When a requester requests the service provider for recordation of electronic information such as a web page by designating both of its location (e.g. a URL) and a recording condition such as a recording period of time (in step S21), the copy obtaining function 51 may determine an access condition in accordance with the recording condition (in step S21). The copy obtaining function 51 may then access the web page of the URL at a prescribed timing from a prescribed access source IP address, and obtain a copy of the web page (in step S25).

The attribute information generating function 53 may then generate an attribute information from the URL of the web page and the access source IP address as an access condition (in step S27). After that, the certificate obtaining function 55 may obtain, from the time stamp certificate issuing function 71, an electronic certificate which specifies the copy of the web page and the attribute information (in step S29). The preservation function 57 may then examine whether contents of the copy of the web page previously accessed and obtained are different from those of the copy of the web page currently accessed (in step S31). Such an examination may be performed in such a manner that the copy of the web page whose change is lately detected and stored in the memory 61 is read and compared with



the copy of the web page currently accessed.

When any change is detected (yes in step S31) the copy of the current web page, applicable new attribute information, and an applicable electronic certificate may be tied up and collectively preserved in the memory 61 (in step S33). On the other hand, when a change is not detected (no in step S31), only the new attribute information and the new electronic certificate may be preserved in the memory 61 (in step S35). These operations are repeated until a recordation terminating condition is satisfied (in step S37). When the above noted operational flow is completed, prescribed electronic information may be preserved in various manners and a transition of the prescribed web page may be certified.

Various manners of preserving the electronic information are now described with reference to Fig. 4.

During a first access, a copy of the prescribed web page, applicable attribute information, and applicable electronic certificate may be collectively preserved because it is considered that all of the electronic information of the web page is changed. During a second access, a copy of the prescribed web page currently obtained may be compared with that of the prescribed web page preserved at the first access. Only an updated electronic certificate and updated attribute information may collectively be preserved if no change exists between the previous and current copies of the web pages.

Moreover, during a third access, a copy of the prescribed web page currently obtained may be compared with that of the prescribed web page preserved at the first access. Only an updated electronic certificate and updated attribute information may be preserved if no change exists between the previous and current copies of the prescribed web pages.

During a fourth access, a copy of the prescribed web page currently obtained may be compared with that of the prescribed web page preserved at the first access. The copy of the web page currently obtained, updated attribute information, and an updated electronic certificate may collectively be preserved if a change exists between the previous and current copies of the prescribed web pages. Similar operations may be continuously performed at a prescribed frequency designated by the requester. A comparing objective may be a copy of a prescribed web page whose last change is detected and preserved as mentioned earlier.

A modified operation performed by the second server 5 in response to a request from a requester for recorded electronic information is now described with reference to an operational flow illustrated in Fig. 5.

Since electronic information (i.e., a web page) is included in a request from a requester as an objective, the certificate providing function 59 may first specify the prescribed electronic information (in step S43), and read a copy of the objective electronic information, applicable attribute information, and an applicable electronic certificate from the memory 61 (in step S45). Only one set of data may generally be read when the request designates only one time recordation of the electronic information or an objective electronic information results in deletion after the first access.

However, since a plurality of the electronic information are generally recorded, a plurality of sets of copies of the electronic information, applicable attribute information, and applicable electronic certificates may generally be read. In such a case, the certificate providing function 59 may time an electronic information-releasing period of time (in step S47). The electronic information-releasing period of time may be recognized if a pair of the electronic certificates respectively including the certifying time and date are obtained respectively at a first access and a last access and each certifying time and date is compared with the other. To this end, such information may be regarded as the electronic information-releasing period of time. However, such a function may be optional.

The certificate providing function 59 may finally store, for example into the CD-R, the copy of the objective electronic information, applicable attribute information, and an applicable electronic certification beside the electronic information-releasing period of time (in step S49).

One example of generating the electronic certificate is now described in detail referring to Fig. 6.

The electronic certificate can be issued in any manner in the present invention as long as the electronic certificate uniquely specifies an electronic information and its attribute information. Thus, the following is one example among various systems to issue the electronic certificate. When electronic information 101 is an objective of an electronic certificate, a hash value 103 of the electronic information 101 may be calculated. Such a hash value and calculation manner are described in detail in the United States Patent Application No. 441056/99 filed by the same applicant, the entire contents of which are hereby incorporated herein by reference. However, any hash function is suitable as long as it includes one way function in the present invention.

The certificate obtaining function 55 may calculate the hash value 103 at least of both

of the copied electronic information and its attribute information. The certificate obtaining function 55 may transmit a request with the hash value 103 to the time stamp certificate issuing function 71 for issuance of an electronic certificate. The time stamp certificate issuing function 71 may receive and process the hash value 103 (indicated by a grid area) in a prescribed manner together with another hash value sent from the same or a different computer server (indicated by blanks of the right side of the hash value 103). The another hash value may separately be calculated and transmitted to the certificate obtaining function 55 in the same manner as the hash value 103. The time stamp certificate issuing function 71 may repeat generating a new hash value from two hash values in a tournament system, for example, so that only one hash value 106 may finally be obtained as illustrated in Fig. 6.

A super hash value (hereinafter referred to as a SHV) 107 may then be generated at a time (T) from the hash value 106 and a SHV 105 (i.e., last super hash value) at a time (T-1), wherein (T) is an integer. The SHV 107, the hash value 103, time information, and a document ID of the electronic information (e.g. a file name) may be included in the electronic certificate 109.

Thereby, the electronic certificate 109 can uniquely specify the electronic information 101 (i. e., a web page) and/or the attribute information using the combination of the SHV 107 and the hash value 103. The electronic certificate 109 may then be returned to a sender of the hash value 103 (i.e., the certificate obtaining function 55). As a result, the electronic information 101 and the applicable access time and date may uniquely be specified and tied up with the electronic certificate 109. The hash value 103 itself or in combination with the SHV 107 may constitute an inherent information related to the combination of the electronic information and the attribute information.

Specifically, if any one of the electronic information and the attribute information is falsified after the certification by the time stamp function, the hash value varies after the falsification. Thus, if the hash value in the attribute information included in the electronic certificate is not changed, the corresponding electronic information, for example, included in the CD-R can be regarded as accessed at the time and date also included in the CD-R. Thus, in such a case, the CD-R can be prescribed evidence such as in a patent related field.

Further, if a web page is the electronic information as illustrated in Fig. 6, an HTML 110 document may correspond to the electronic information. Thus, as understood from Fig. 7, a hash value may be calculated from all of attribute information including a URL and an

access source IP address or the like, and the HTML document 110, and an applicable electronic certificate may be generated from the hash value. If prescribed a web page is only composed of a composition, such calculations are sufficient.

5 However, since an image file 112 such as a GIF file may be embedded in the web page, and an image file may also be included in information released on the network, a hash value may be calculated from all of the image file, the HTML document, and applicable attribute information.

10 Moreover, the image file in the HTML document is not limited to a static image and may include an active image, a sound, a file having a format requiring Plug-in software of a browser, and JAVA (TM of Sun Microsystems) Applet. Thus, if these objects are embedded, these objects may also be copied at an access designating a prescribed URL, and the above described hash value calculation may be executed. Such a hash value can be calculated per one file or once for all of the files.

15 Thus, release of electronic information on the network can be certified by the first type of service and its modified services. Further, public notification with respect to the existence and the location of prescribed electronic information can be certified by the first and second types of services.

Further, a transition of an electronic information can be recognized by the fourth type of service.

20 Further, a service provider can efficiently utilize electronic information together with an electronic certificate, and a requester can prompt the public to use prescribed electronic information. In addition, a third person can obtain enforceable electronic information.

25 Further, using such a system in a patent related field, electronic information, applicable attribute information, and an applicable electronic certificate can be utilized as evidence to be submitted to an examiner when filing an opposition or a patent invalidating procedure.

Further, someone's own web page or the like can be utilized as a technical report publication.

30 Further, an applicable electronic certificate can be utilized in a prescribed condition as evidence to be submitted to an examiner when application of a prescribed patent act, with rules of an exception of lack of novelty, is requested.

Even though five or more functions of the second server 5 are included in a single

unit as noted from Fig. 1, these functions can separately be included in respective of a plurality of servers.

Similarly, even though the fourth server 9 displays one or more links to prescribed web pages and retrieves a prescribed web page, these functions can separately be performed by respective of a plurality of servers. The retrieval engine 1 may not be limited to one.

Further, the URL may not be limited to the "http", and a "ftp" can be utilized. The function of the third server 7 can also be included in the second server 5. Each of the service providers performing services with respect to the third server 7 and the second server 5 can be either the same or different providers.

The network 1 may not be limited to the Internet and may include other networks which allow non-exclusive access.

Moreover, even though the CD-R 63 is utilized as a medium storing the recorded electronic information to be provided to a requester, a CD-ROM, DVD, etc. can be employed. A separating manner which separates a plurality of functions as illustrated in Fig. 1 is just one example, and even one function can be divided into a plurality of function segments. To the contrary, a plurality of functions can also be united into one.

A system can be structured by combining one or more programs with a plurality of computers realizing functions as illustrated in Fig. 1. Otherwise, the system can be either partially or entirely realized using a private use electronic circuit or the like.

Another embodiment of the present invention is now described with reference to Figs. 8 through 16.

When a web page is the electronic information 101 as illustrated in Fig. 6, a hypertext markup language (hereinafter referred to as an HTML) document corresponds to the electronic information. No problem occurs if contents of the web page include only composition data.

However, image files such as GIF files are often embedded in web pages. For example, and as illustrated in Fig. 8, when a web page 31 of the first server 3 is inspected using a browser of a client computer (not shown) coupled to the network 1, it may be displayed looking like a web page 200 which includes a plurality of prescribed objects 201 and 202 such as a static image embedded inline. Such an object embedded in the web page 200 may include in addition to a static image, an animation, a sound, a file having a format requiring a Plug-in software or the like of the browser, a Java (TM of Sun Microsystems

Corporation) Applet, etc., as described in the first embodiment, and generally be included in information released on the network 1.

Further, a plurality of links 205 through 209 linking to another web page or another object may be included in the web page 200 as an external resource as illustrated in Fig. 8.

Contents of the linking destination web page or object can not be released on a web page of a prescribed URL, generally.

However, a user of the network 1 can readily obtain electronic information of the linking destination, and accordingly, that information is available to the public. Moreover, the web pages or objects of the destinations of the plurality of the links 205 through 209 respectively includes a prescribed relationship with the web page 200. Thus, a person who generates an HTML document of the web page 200 may occasionally intend integrally to disclose information of the web page 200 and the linking destination web page or object. Then, a problem occurs whether such a linking destination web page or an object is to be included in an objective of the electronic certificate.

In addition, when the HTML document and the plurality of the objects 201 and 203 as illustrated in Fig. 8 are locally preserved (i.e., stored in a personal computer), for example, in the second server 5, as respective files, and the HTML document is inspected using the browser, only a plurality of frames 201a and 203b of the objects 201 and 203 are displayed in the web page 200a as illustrated in Fig. 9. In a particular case, prescribed marks 201b and 203b respectively representing failure to read may be displayed in the respective frames. Moreover, when the plurality of links 205 through 209 is selected using a pointer, none of the linking destination web pages or objects can be inspected. This is because the following description is included in the HTML document of the web page 200 as one example.

The below-described first list illustrates a case in which a prescribed object is embedded inline. The below-described second list illustrates a case in which a prescribed external resource is utilized through a link.

[First List]

```
<IMG SRC ="/image/image01.gif">
<OBJECT DATA ="/video/video. avi" TYPE "= video/avi">
</OBJECT>
<APPLET CODE ="/applet/animator. Class" WIDTH=100 HEIGHT=100>
</APPLET>
```

[Second List]

<A HREF="/image/image02.gif" > 1. IMAGE </A>

<A HREF=" http://xyz.co.jp/home.html"> 2. web page </A>

The first line of the first list represents that a directory named "image" exists below a directory where an HTML document of the web page 200 exists, and a GIF file "image 01. gif" is displayed. Thus, when the HTML document is locally preserved in the second server 5 it is, of course, not guaranteed that the directory named "image" exists below the directory preserving the HTML document nor that "image 01. gif" is preserved in it.

Further, the second line of the first list represents that a directory named "video" exists below a directory where an HTML document of the web page 200 exists, and an animation file named "video/avi" is displayed in a MIME form. Thus, when the HTML document is locally preserved in the second server 5 it is, of course, not guaranteed that the directory named "video" exists below the directory preserving an HTML document nor that "video avi" is preserved in it.

Further, the third line of the first list represents that a directory named "Applet" exists below a directory where an HTML document of the web page 200 exists, and Java applet "animator. class" is practiced. Moreover, it represents that a prescribed display is displayed within a frame of 100 x 100. Thus, similarly to the above, if the HTML document is locally preserved in the second server 5, it is not guaranteed that the directory named "applet" exists below the directory preserving the HTML document nor that the "applet. class" is preserved in it.

Further, the first line of the second list represents that a directory named "image" exists below a directory where an HTML document of a web page 200 exists, and a link affixed to a GIF file "image 02.gif" is displayed. Since only the link is displayed and contents of the applicable file are not displayed when the HTML document is displayed, the contents of the file are not automatically transmitted via the network 1. Thus, when the HTML document is preserved in the second server 5, it is guaranteed that not only the directory named "image" exists below the directory preserving the HTML document, but also that the "image 02. gif" is preserved in it.

Further, the second line of the second list represents that a link is displayed on a web page having an URL of <http://www.xyz.co.jp/home.html>, not on the URL of the server that

preserves the HTML document of the web page 200. As a result, since the link is only displayed and contents of the applicable file are not displayed when the HTML document is displayed, the contents of the file are not automatically transmitted via the network.

Moreover, if the HTML document is preserved in the second server 5, the preservation destination can not be "<http://www.xyz.co.jp/home.html>". Thus, if an HTML document of a web page 200 is locally preserved, and contents of its file are to be confirmed using the browser or the like, an object embedded inline and contents of the linking destination can not be inspected.

As a result, contents released on the network 1 will not entirely be recognized later, even if the HTML document is preserved. To this end, the second embodiment may preserve one of copies of the HTML document of the web page 200 as an original as it is, and the other copy whose contents are changed in a prescribed manner so that the entire web page will be recognized when inspected. Specifically, the HTML document of the web page may be changed in the following manner in cases corresponding to the first and second lists.

[Third List]

```
<IMG SRC =" image 01.gif">
<OBJECT DATA =" Video. avi" TYPE =" video/avi"> </OBJECT>
<APPLET CODE ="animator. class" WIDTH = 100 HEIGHT = 100>
</APPLET>
```

[Fourth List]

```
<A HREF ="/reference/image 02.gif"> 1. Image </A>
<A HREF ="/reference/home. Html"> 2. Web page </A>
```

The third list may represent that an object embedded inline is preserved in a same directory with the HTML document that is changed in the prescribed manner. This is because it is simpler in a supervising point of view to preserve attribute information, an electronic certificate, and an HTML document or its version of the web page 200 all obtained or generated during an access in the same directory with the object.

That is, however, just one example, and another rule can be adopted when data is stored in the memory 61, for example, in a manner such that a plurality of directories are separately assigned and respectively store objects embedded inline. The fourth list may represent that an object referred to as an external resource or an HTML document of another



Web page may be preserved in a directory named "reference" existing below a directory that preserves a HTML document, for example, which has changed. Namely, a separate directory may preferably be assigned to store the object or the changed HTML document because the object or changed HTML document is sometimes not required.

5 That is, however, just one example, and another rule can be adopted when data is stored in the memory 61. For example, the object or the HTML document can be preserved in the same directory with an original or changed version of the HTML documents. In any case, either a web page includes the inline object or the web page includes an object and/or another web page of the external resource, all of the HTML document, and each of the  
10 objects may be preserved as it is as an original file.

In addition, the HTML document is changed and preserved for inspecting use as another file. An applicable electronic certificate may then be obtained with regard to these files and the attribute information. Thus, a construction of the second server 5 illustrated in Fig. 1 may be changed to that of a second server 5' as illustrated in Fig. 10. Namely, the  
15 copy obtaining function 151 may obtain, beside designated electronic information, an object embedded inline, and an object and/or another electronic information all referred to as an external resource.

The copy changing function 153 may then change, as described above, the object, and a reading source of another electronic information. The attribute information generating  
20 function 155 may then generate attribute information associated with the object and that electronic information. In such a case, its reference destination of the reading source may sometimes be included in the attribute information, if a copy of the electronic information or the object of the reference destination has already been obtained.

In addition, prescribed information representing that whatever copy of a file is an  
25 objective of an electronic certificate may occasionally be included in the attribute information. The certificate obtaining function 157 may then obtain an electronic certificate with regard to the certificate-issuing objective from the time stamp certificate issuing function 71. The preservation function 159 may then store a file of the certificate-issuing  
30 objective in a prescribed position in the memory 61'. Thus, the memory 61' may store the copy of the electronic information, its version, an applicable electronic certificate, and applicable object, for example, embedded. The certificate providing function 161 may then read a prescribed information stored in the memory 61' in response to a request for prescribed

recorded contents, and generate the CD-R 63'. Since the copy of the version of the electronic information and the object are included in the CD-R63', a certifying objective-electronic information can be reproduced in the same condition as released online.

Further, it is optional whether a copy of an electronic information before change may be preserved and whether that of the electronic information before change is provided, in response to a request for recorded contents.

An operational procedure executed in response to a recording request is now described referring to Fig. 11.

When a requester sends a request to a service provider for recordation of prescribed electronic information (e.g. a web page) while designating both its location (e.g. an URL) and a prescribed recording condition (e.g. a recording period of time) (in step S61), the copy obtaining function 151 may determine an accessing condition so as to accord with the recording condition (in step S63). The copy obtaining function 151 may then accesses the URL from a prescribed access source IP address at a prescribed timing and obtain a copy of the web page (in step S65). The recording request may occasionally include a designation of copies of web pages on different layers and linked with each other, and the copy obtaining function 151 may copy link destination web pages.

Subsequently, the copy changing function 153 may determine if the web page copy includes the objects or the like (in step S67). If the copied web page includes any one of them (yes in step S67), the copy changing function 153 may change the contents of the HTML document of the web page as illustrated in the fourth list (e.g. by assigning "/reference/") (in step S69) so that an object embedded inline in the copy of the web page, which will locally be preserved, can be displayed.

On the other hand, when the web page includes none of linking web pages and objects (no in step S67), the system progresses to step S71. Then, the attribute information generating function 155 may generate attribute information including both of a web page URL and an accessing source IP address as an accessing condition (in step S71).

Subsequently, the certificate obtaining function 157 may obtain the following electronic certificates from the time stamp certificate issuing function 71 (in step S73). The electronic certificates may include a certificate certifying the existence of the web page, the attribute information, the inline object or the version of the HTML document if any link exists, the HTML document, and the object referred to as the external resource. The

preservation function 159 may then store all of information uniquely specified and certified by the electronic certificate with the time and date in the memory 61' (in step S75). The copy of the HTML document of the web page may optionally be preserved in the memory 61'.

These operations are repeated until the recordation terminating condition is satisfied (in step S77). The recordation terminating condition may be a condition when a recording time period designated by a requester has elapsed and when a number of recording times designated by a requester reach a prescribed level or the like.

The copy obtaining operation described with reference to Fig. 11 is now described with reference to Fig. 12 in further detail.

A copy of an HTML document of a prescribed web page as an access destination designated by a requester may be obtained (in step S93). The copy of the HTML document may then be analyzed and examined if an object embedded inline is included (in step S95). If the object is included, a copy of the object may also be obtained (in step S97). If the object is not included, the process goes to step S99.

Subsequently, it is determined if a link either with another web page or with another object exists (in step S99). If any one of them exists (yes in step S99), a copy of the HTML document of another web page as a linking destination or another object may be obtained (in step S101). If none exists (no in step S99), the process is terminated. As noted from Fig. 12, a web page and/or an object existing below a web page of access destination by one layer may be a copy objective range. Thus, if a web page and/or an object existing below the web page of the initial access destination by two or more layers are to be copied, an operation illustrated in Fig. 12 may be practiced while regarding such below web pages as the access destination in step S93. In such a case, if one or more linking destinations existing below a prescribed layer among these layers are not copying objective, the process may preferably be terminated without practicing steps S99 and S101. Thus, an electronic certificate may be obtained with regard to the information obtained and/or generated.

Further, if an electronic certificate described with reference to Fig. 7 is obtained, a hash value may be calculated by the following manners.

If an object is embedded inline and an external resource is not referred to as illustrated in Fig. 13, totally one hash value can be generated with regard to all of the files of an HTML document of an access destination web page, one or more objects, preferably two objects, applicable attribute information, and a version of the HTML document. Thus, one

electronic certificate may be obtained.

If an object is embedded inline and an external resource is referred to as noted from Fig. 14, totally one hash value can also be generated with regard to all of the files of the HTML document, the object, the applicable attribute information, the version of the HTML document, and the reference destination HTML document or the object. Thus, one electronic certificate can be obtained.

Further, if an object is embedded inline and an external resource is referred to as illustrated in Fig. 15, a first hash value 1 can be generated with regard to all of the files of the HTML document, the object, the applicable attribute information, and the version of the HTML document. A second hash value 2 can be generated with regard to a file of a reference destination HTML document (or a file of an object) and its applicable attribute information. In such a case, since an electronic certificate with regard to the HTML document of the reference destination web page is independently issued, release of the web page on the network can be separately certified.

Further, only one of the object embedded inline and the web page or the object referred to can be obtained depending on a designation of the requester. Further, a layer below the initially referred web page can also be referred to as the external resource. However, it can also be handled in accordance with a designation of the requester.

If the requester issues none of designations, a prescribed rule can automatically be adopted in such a manner that a first layer below the first layer by one can in principle be obtained. Further, when an object is embedded inline in a reference destination web page, the object can be regarded and handled as is included in the reference destination web page.

One example of a certificate providing operation performed responsive to a request for recorded contents is now described with reference to Fig. 16.

The certificate providing function 161 may identify a certifying objective electronic information from a request for recorded contents (in step S81). Subsequently, the certificate providing function 161 may read from the memory 61' a copy of objective electronic information, an applicable electronic certificate, attribute information, an object embedded inline, a reference destination object or an electronic information, and a copy of a version of the objective electronic information.

After that, that information may be provided with the CD-R 63 or the like (in step S85). When a request for recorded contents is made as described earlier with reference to the

fifth type service, substantially the same operation as illustrated in Fig. 16 may be practiced.

Obviously, numerous additional modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the present invention may be practiced otherwise than as

5 specifically described herein.

11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113  
114  
115  
116  
117  
118  
119  
120  
121  
122  
123  
124  
125  
126  
127  
128  
129  
130  
131  
132  
133  
134  
135  
136  
137  
138  
139  
140  
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151  
152  
153  
154  
155  
156  
157  
158  
159  
160  
161  
162  
163  
164  
165  
166  
167  
168  
169  
170  
171  
172  
173  
174  
175  
176  
177  
178  
179  
180  
181  
182  
183  
184  
185  
186  
187  
188  
189  
190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237  
238  
239  
240  
241  
242  
243  
244  
245  
246  
247  
248  
249  
250  
251  
252  
253  
254  
255  
256  
257  
258  
259  
260  
261  
262  
263  
264  
265  
266  
267  
268  
269  
270  
271  
272  
273  
274  
275  
276  
277  
278  
279  
280  
281  
282  
283  
284  
285  
286  
287  
288  
289  
290  
291  
292  
293  
294  
295  
296  
297  
298  
299  
300  
301  
302  
303  
304  
305  
306  
307  
308  
309  
310  
311  
312  
313  
314  
315  
316  
317  
318  
319  
320  
321  
322  
323  
324  
325  
326  
327  
328  
329  
330  
331  
332  
333  
334  
335  
336  
337  
338  
339  
340  
341  
342  
343  
344  
345  
346  
347  
348  
349  
350  
351  
352  
353  
354  
355  
356  
357  
358  
359  
360  
361  
362  
363  
364  
365  
366  
367  
368  
369  
370  
371  
372  
373  
374  
375  
376  
377  
378  
379  
380  
381  
382  
383  
384  
385  
386  
387  
388  
389  
390  
391  
392  
393  
394  
395  
396  
397  
398  
399  
400  
401  
402  
403  
404  
405  
406  
407  
408  
409  
410  
411  
412  
413  
414  
415  
416  
417  
418  
419  
420  
421  
422  
423  
424  
425  
426  
427  
428  
429  
430  
431  
432  
433  
434  
435  
436  
437  
438  
439  
440  
441  
442  
443  
444  
445  
446  
447  
448  
449  
450  
451  
452  
453  
454  
455  
456  
457  
458  
459  
460  
461  
462  
463  
464  
465  
466  
467  
468  
469  
470  
471  
472  
473  
474  
475  
476  
477  
478  
479  
480  
481  
482  
483  
484  
485  
486  
487  
488  
489  
490  
491  
492  
493  
494  
495  
496  
497  
498  
499  
500  
501  
502  
503  
504  
505  
506  
507  
508  
509  
510  
511  
512  
513  
514  
515  
516  
517  
518  
519  
520  
521  
522  
523  
524  
525  
526  
527  
528  
529  
530  
531  
532  
533  
534  
535  
536  
537  
538  
539  
540  
541  
542  
543  
544  
545  
546  
547  
548  
549  
550  
551  
552  
553  
554  
555  
556  
557  
558  
559  
560  
561  
562  
563  
564  
565  
566  
567  
568  
569  
570  
571  
572  
573  
574  
575  
576  
577  
578  
579  
580  
581  
582  
583  
584  
585  
586  
587  
588  
589  
590  
591  
592  
593  
594  
595  
596  
597  
598  
599  
600  
601  
602  
603  
604  
605  
606  
607  
608  
609  
610  
611  
612  
613  
614  
615  
616  
617  
618  
619  
620  
621  
622  
623  
624  
625  
626  
627  
628  
629  
630  
631  
632  
633  
634  
635  
636  
637  
638  
639  
640  
641  
642  
643  
644  
645  
646  
647  
648  
649  
650  
651  
652  
653  
654  
655  
656  
657  
658  
659  
660  
661  
662  
663  
664  
665  
666  
667  
668  
669  
670  
671  
672  
673  
674  
675  
676  
677  
678  
679  
680  
681  
682  
683  
684  
685  
686  
687  
688  
689  
690  
691  
692  
693  
694  
695  
696  
697  
698  
699  
700  
701  
702  
703  
704  
705  
706  
707  
708  
709  
710  
711  
712  
713  
714  
715  
716  
717  
718  
719  
720  
721  
722  
723  
724  
725  
726  
727  
728  
729  
730  
731  
732  
733  
734  
735  
736  
737  
738  
739  
740  
741  
742  
743  
744  
745  
746  
747  
748  
749  
750  
751  
752  
753  
754  
755  
756  
757  
758  
759  
760  
761  
762  
763  
764  
765  
766  
767  
768  
769  
770  
771  
772  
773  
774  
775  
776  
777  
778  
779  
780  
781  
782  
783  
784  
785  
786  
787  
788  
789  
790  
791  
792  
793  
794  
795  
796  
797  
798  
799  
800  
801  
802  
803  
804  
805  
806  
807  
808  
809  
810  
811  
812  
813  
814  
815  
816  
817  
818  
819  
820  
821  
822  
823  
824  
825  
826  
827  
828  
829  
830  
831  
832  
833  
834  
835  
836  
837  
838  
839  
840  
841  
842  
843  
844  
845  
846  
847  
848  
849  
850  
851  
852  
853  
854  
855  
856  
857  
858  
859  
860  
861  
862  
863  
864  
865  
866  
867  
868  
869  
870  
871  
872  
873  
874  
875  
876  
877  
878  
879  
880  
881  
882  
883  
884  
885  
886  
887  
888  
889  
890  
891  
892  
893  
894  
895  
896  
897  
898  
899  
900  
901  
902  
903  
904  
905  
906  
907  
908  
909  
910  
911  
912  
913  
914  
915  
916  
917  
918  
919  
920  
921  
922  
923  
924  
925  
926  
927  
928  
929  
930  
931  
932  
933  
934  
935  
936  
937  
938  
939  
940  
941  
942  
943  
944  
945  
946  
947  
948  
949  
950  
951  
952  
953  
954  
955  
956  
957  
958  
959  
960  
961  
962  
963  
964  
965  
966  
967  
968  
969  
970  
971  
972  
973  
974  
975  
976  
977  
978  
979  
980  
981  
982  
983  
984  
985  
986  
987  
988  
989  
990  
991  
992  
993  
994  
995  
996  
997  
998  
999  
1000  
1001  
1002  
1003  
1004  
1005  
1006  
1007  
1008  
1009  
1010  
1011  
1012  
1013  
1014  
1015  
1016  
1017  
1018  
1019  
1020  
1021  
1022  
1023  
1024  
1025  
1026  
1027  
1028  
1029  
1030  
1031  
1032  
1033  
1034  
1035  
1036  
1037  
1038  
1039  
1040  
1041  
1042  
1043  
1044  
1045  
1046  
1047  
1048  
1049  
1050  
1051  
1052  
1053  
1054  
1055  
1056  
1057  
1058  
1059  
1060  
1061  
1062  
1063  
1064  
1065  
1066  
1067  
1068  
1069  
1070  
1071  
1072  
1073  
1074  
1075  
1076  
1077  
1078  
1079  
1080  
1081  
1082  
1083  
1084  
1085  
1086  
1087  
1088  
1089  
1090  
1091  
1092  
1093  
1094  
1095  
1096  
1097  
1098  
1099  
1100  
1101  
1102  
1103  
1104  
1105  
1106  
1107  
1108  
1109  
1110  
1111  
1112  
1113  
1114  
1115  
1116  
1117  
1118  
1119  
1120  
1121  
1122  
1123  
1124  
1125  
1126  
1127  
1128  
1129  
1130  
1131  
1132  
1133  
1134  
1135  
1136  
1137  
1138  
1139  
1140  
1141  
1142  
1143  
1144  
1145  
1146  
1147  
1148  
1149  
1150  
1151  
1152  
1153  
1154  
1155  
1156  
1157  
1158  
1159  
1160  
1161  
1162  
1163  
1164  
1165  
1166  
1167  
1168  
1169  
1170  
1171  
1172  
1173  
1174  
1175  
1176  
1177  
1178  
1179  
1180  
1181  
1182  
1183  
1184  
1185  
1186  
1187  
1188  
1189  
1190  
1191  
1192  
1193  
1194  
1195  
1196  
1197  
1198  
1199  
1200  
1201  
1202  
1203  
1204  
1205  
1206  
1207  
1208  
1209  
1210  
1211  
1212  
1213  
1214  
1215  
1216  
1217  
1218  
1219  
1220  
1221  
1222  
1223  
1224  
1225  
1226  
1227  
1228  
1229  
1230  
1231  
1232  
1233  
1234  
1235  
1236  
1237  
1238  
1239  
1240  
1241  
1242  
1243  
1244  
1245  
1246  
1247  
1248  
1249  
1250  
1251  
1252  
1253  
1254  
1255  
1256  
1257  
1258  
1259  
1260  
1261  
1262  
1263  
1264  
1265  
1266  
1267  
1268  
1269  
1270  
1271  
1272  
1273  
1274  
1275  
1276  
1277  
1278  
1279  
1280  
1281  
1282  
1283  
1284  
1285  
1286  
1287  
1288  
1289  
1290  
1291  
1292  
1293  
1294  
1295  
1296  
1297  
1298  
1299  
1300  
1301  
1302  
1303  
1304  
1305  
1306  
1307  
1308  
1309  
1310  
1311  
1312  
1313  
1314  
1315  
1316  
1317  
1318  
1319  
1320  
1321  
1322  
1323  
1324  
1325  
1326  
1327  
1328  
1329  
1330  
1331  
1332  
1333  
1334  
1335  
1336  
1337  
1338  
1339  
1340  
1341  
1342  
1343  
1344  
1345  
1346  
1347  
1348  
1349  
1350  
1351  
1352  
1353  
1354  
1355  
1356  
1357  
1358  
1359  
1360  
1361  
1362  
1363  
1364  
1365  
1366  
1367  
1368  
1369  
1370  
1371  
1372  
1373  
1374  
1375  
1376  
1377  
1378  
1379  
1380  
1381  
1382  
1383  
1384  
1385  
1386  
1387  
1388  
1389  
1390  
1391  
1392  
1393  
1394  
1395  
1396  
1397  
1398  
1399  
1400  
1401  
1402  
1403  
1404  
1405  
1406  
1407  
1408  
1409  
1410  
1411  
1412  
1413  
1414  
1415  
1416  
1417  
1418  
1419  
1420  
1421  
1422  
1423  
1424  
1425  
1426  
1427  
1428  
1429  
1430  
1431  
1432  
1433  
1434  
1435  
1436  
1437  
1438  
1439  
1440  
1441  
1442  
1443  
1444  
1445  
1446  
1447  
1448  
1449  
1450  
1451  
1452  
1453  
1454  
1455  
1456  
1457  
1458  
1459  
1460  
1461  
1462  
1463  
1464  
1465  
1466  
1467  
1468  
1469  
1470  
1471  
1472  
1473  
1474  
1475  
1476  
1477  
1478  
1479  
1480  
1481  
1482  
1483  
1484  
1485  
1486  
1487  
1488  
1489  
1490  
1491  
1492  
1493  
1494  
1495  
1496  
1497  
1498  
1499  
1500  
1501  
1502  
1503  
1504  
1505  
1506  
1507  
1508  
1509  
1510  
1511  
1512  
1513  
1514  
1515  
1516  
1517  
1518  
1519  
1520  
1521  
1522  
1523  
1524  
1525  
1526  
1527  
1528  
1529  
1530  
1531  
1532  
1533  
1534  
1535  
1536  
1537  
1538  
1539  
1540  
1541  
1542  
1543  
1544  
1545  
1546  
1547  
1548  
1549  
1550  
1551  
1552  
1553  
1554  
1555  
1556  
1557  
1558  
1559  
1560  
1561  
1562  
1563  
1564  
1565  
1566  
1567  
1568  
1569  
1570  
1571  
1572  
1573  
1574  
1575  
1576  
1577  
1578  
1579  
1580  
1581  
1582  
1583  
1584  
1585  
1586  
1587  
1588  
1589  
1590  
1591  
1592  
1593  
1594  
1595  
1596  
1597  
1598  
1599  
1600  
1601  
1602  
1603  
1604  
1605  
1606  
1607  
1608  
1609  
1610  
1611  
1612  
1613  
1614  
1615  
1616  
1617  
1618  
1619  
1620  
1621  
1622  
1623  
1624  
1625  
1626  
1627  
1628  
1629  
1630  
1631  
1632  
1633  
1634  
1635  
1636  
1637  
1638  
1639  
1640  
1641  
1642  
1643  
1644  
1645  
1646  
1647  
1648  
1649  
1650  
1651  
1652  
1653  
1654  
1655  
1656  
1657  
1658  
1659  
1660  
1661  
1662  
1663  
1664  
1665  
1666  
1667  
1668  
1669  
1670  
1671  
1672  
1673  
1674  
1675  
1676  
1677  
1678  
1679  
1680  
1681  
1682  
1683  
1684  
1685  
1686  
1687  
1688  
1689  
1690  
1691  
1692  
1693  
1694  
1695  
1696  
1697  
1698  
1699  
1700  
1701  
1702  
1703  
1704  
1705  
1706  
1707  
1708  
1709  
1710  
1711  
1712  
1713  
1714  
1715  
1716  
1717  
1718  
1719  
1720  
1721  
1722  
1723  
1724  
1725  
1726  
1727  
1728  
1729  
1730  
1731  
1732  
1733  
1734  
1735  
1736  
1737  
1738  
1739  
1740  
1741  
1742  
1743  
1744  
1745  
1746  
1747  
1748  
1749  
1750  
1751  
1752  
1753  
1754  
1755  
1756  
1757  
1758  
1759  
1760  
1761  
1762  
1763  
1764  
1765  
1766  
1767  
1768  
1769  
1770  
1771  
1772  
1773  
1774  
1775  
1776  
1777  
1778  
1779  
1780  
1781  
1782  
1783  
1784  
1785  
1786  
1787  
1788  
1789  
1790  
1791  
1792  
1793  
1794  
1795  
1796  
1797  
1798  
1799  
1800  
1801  
1802  
1803  
1804  
1805  
1806  
1807  
1808  
1809  
1810  
1811  
1812  
1813  
1814  
1815  
1816  
1817  
1818  
1819  
1820  
1821  
1822  
1823  
1824  
1825  
1826  
1827  
1828  
1829  
1830  
1831  
1832  
1833  
1834  
1835  
1836  
1837  
1838  
1839  
1840  
1841  
1842  
1843  
1844  
1845  
1846  
1847  
1848  
1849  
1850  
1851  
1852  
1853  
1854  
1855  
1856  
1857  
1858  
1859  
1860  
1861  
1862  
1863  
1864  
1865  
1866  
1867  
1868  
1869  
1870  
1871  
1872  
1873  
1874  
1875  
1876  
1877  
1878  
1879  
1880  
1881  
1882  
1883  
1884  
1885  
1886  
1887  
1888  
1889  
1890  
1891  
1892  
1893  
1894  
1895  
1896  
1897  
1898  
1899  
1900  
1901  
1902  
1903  
1904  
1905  
1906  
1907  
1908  
1909  
1910  
1911  
1912  
1913  
1914  
1915  
1916  
1917  
1918  
1919  
1920  
1921  
1922  
1923  
1924  
1925  
1926  
1927  
1928  
1929  
1930  
1931  
1932  
1933  
1934  
1935  
1936  
1937  
1938  
1939  
1940  
1941  
1942  
1943  
1944  
1945  
1946  
1947  
1948  
1949  
1950  
1951  
1952  
1953  
1954  
1955  
1956  
1957  
1958  
1959  
1960  
1961  
1962  
1963  
1964  
1965  
1966  
1967  
1968  
1969  
1970  
1971  
1972  
1973  
1974  
1975  
1976  
1977  
1978  
1979  
1980  
1981  
1982  
1983  
1984  
1985  
1986  
1987  
1988  
1989  
1990  
1991  
1992  
1993  
1994  
1995  
1996  
1997  
1998  
1999  
2000  
2001  
2002  
2003  
2004  
2005  
2006  
2007  
2008  
2009  
2010  
2011  
2012  
2013  
2014  
2015  
2016  
2017  
2018  
2019  
2020  
2021  
2022  
2023  
2024  
2025  
2026  
2027  
2028  
2029  
2030  
2031  
2032  
2033  
2034  
2035  
2036  
2037  
2038  
2039  
2040  
2041  
2042  
2043  
2044  
2045  
2046  
2047  
2048  
2049  
2050  
2051  
2052  
2053  
2054  
2055  
2056  
2057  
2058  
2059  
2060  
2061  
2062  
2063  
2064  
2065  
2066  
2067  
2068  
2069  
2070  
2071  
2072  
2073  
2074  
2075  
2076  
2077  
2078  
2079  
2080  
2081  
2082  
2083  
2084  
2085  
2086  
2087  
2088  
2089  
2090  
2091  
2092  
2093  
2094  
2095  
2096  
2097  
2098  
2099  
2100  
2101  
2102  
2103  
2104  
2105  
2106  
2107  
2108  
2109  
2110  
2111  
2112  
2113  
2114  
2115  
2116  
2117  
2118  
2119  
2120  
2121  
2122  
2123  
2124  
2125  
2126  
2127  
2128  
2129  
2130  
2131  
2132  
2133  
2134  
2135  
2136  
2137  
2138  
2139  
2140  
2141  
2142  
2143  
2144  
2145  
2146  
2147  
2148  
2149  
2150  
2151  
2152  
2153  
2154  
2155  
2156  
2157  
2158  
2159  
2160  
2161  
2162  
2163  
2164  
2165  
2166  
2167  
2168  
2169  
2170  
2171  
2172  
2173  
2174  
2175  
2176  
2177  
2178  
2179  
2180  
2181  
2182  
2183  
2184  
2185  
2186  
2187  
2188  
2189  
2190  
2191  
2192  
2193  
2194  
2195  
2196  
2197  
2198  
2199  
2200  
2201  
2202  
2203  
2204  
2205  
2206  
2207  
2208  
2209  
2210  
2211  
2212  
2213  
2214  
2215  
2216  
2217  
2218  
2219  
2220  
2221  
2222